Memorandum

To: Accuracy Working Group List (see attached list)

From: Mike Paglione, *FAA ACT-250;*
Lori Charles, *Signal Corporation*

Date: 1/18/2002

Re: **Analysis of User Request Evaluation Tool Daily Use System Aircraft to Airspace**

Predictions for the RevA ZDC Risk Reduction Runs

Scope

As part of the Risk Reduction Task, the ACT-250 Conflict Probe Assessment Team (CPAT) has developed a set of software tools to directly measure the missed and false alert rates of the User Request Evaluation Tool Daily Use (URET DU) aircraft to airspace conflict predictions. This is analogous to what MITRE CAASD developed to measure the aircraft to aircraft conflict predictions for the specification refresh. The tools will provide accuracy information for the various Risk Reductions Scenarios planned for late FY01 and FY02.

This study includes two current plan accuracy runs for the ZDC Risk Reduction scenarios. The study will support the informal accuracy analysis of the URET CCLD system in ZDC, namely the aircraft to airspace conflict prediction requirements CIA1061 through CIA1066.

Results

Table 1 provides the counts of the various alert records, conflicts, and missed alert probability for each scenario for the current plans. The airspace conflicts are currently defined as penetrations of the buffered boundaries of the locally adapted special use airspaces from the aircraft post processed track positions. Vertically a distance of 500 feet below flight level 290 and 1000 feet above is included as part of the buffered boundaries of the special use airspaces. Horizontally the buffered boundaries of the special use airspaces are defined by URET DU adaptation.

As defined by the URET CCLD specification, the probability of false alerts is a function of the number of false alerts divided by the number of non-conflict encounters within certain ranges of minimum horizontal separations. These non-conflict encounters have separations up to 30 nautical miles from the buffered boundaries of the special use airspace (SUA) horizontally and 4000 feet below flight level 290 and 5000 feet above vertically. For false alerts with encounters beyond these thresholds both horizontally and vertically, the counts fall into the largest false alert bin. For retracted false alerts, which match a particular conflict, the minimum horizontal separation is

assumed zero, so these cases are tallied in the smallest bin. Tables 2a-b contain the encounter counts, false alert counts and false alert probabilities per requirement bin for each scenario.

An additional outcome of the study was the twelve specific reasons for the various aircraft to airspace accounting of the missed, false, valid, and discarded conflict predictions. Table 3 describes the various reasons and lists the counts for each scenario. For example, the Table 3 row labeled NO_CALL_MA is an aircraft to airspace conflict that was not notified at all by URET DU. These errors contributed to 42 of the 48 total missed alerts for the ZDC 1740_2030 scenario current plan run. Note that, of the 42 no call missed alerts, there were only 18 SAAs involved, which may indicate adaptation problems with these SAAs. Also, URET DU did present notifications for the remaining 6 of the 48 total missed alerts, but they were not presented within the required 5 minutes of the actual conflict start time. In this case, the 6 missed alerts are found in the next row in Table 3, labeled LATE_MA.

Conclusion

This study provides a direct measure of the performance of URET DU aircraft to airspace conflict predictions for the two ZDC Risk Reduction scenarios. This was only performed for the current plan runs and only the SUAs locally adapted by URET DU for ZDC in the October 5, 2000 chart cycle are being applied in this study. All the SUAs remain active for the duration of the runs.

This study completes the analysis of aircraft to airspace conflict predictions for the single site ZDC Risk Reduction runs of URET DU.

Table 1: Current Plan Runs Alert and Conflict Record Counts

Description	SCENARI0 RR ZDC 1740_2030		RR ZDC 2030_2230	
Total Alert Records	7257		3676	
Total Notification Sets	1279		763	
Total Number of MAs	48		37	
Total Number of FAs	241		179	
Total Number of VAs	115		80	
Total Number of Discards	917		498	
Total Number of Encounters (not conflicts)	3865		2532	
Total Number of Conflicts (C)	163		117	
Missed Alert Probability = #MA/(#MA+#VA)	0.294		0.316	

Table 2a: RR ZDC Current Plan Runs 1740_2030 Study False Alert Probabilities

FA Bin	#Encounters	#FAs	Prob(FA)
0 >= X < 7	909	134	0.147
7 >= X < 9	231	12	0.052
9 >= X < 11	242	8	0.033
11 >= X < 16	578	13	0.022
16 >= X	1905	74	0.039
Subtotals	3865	241	

Table 2b: RR ZDC Current Plan Runs 2030_2230 Study False Alert Probabilities

FA Bin	#Encounters	#FAs	Prob(FA)
0 >= X < 7	548	87	0.159
7 >= X < 9	145	7	0.048
9 >= X < 11	184	13	0.071
11 >= X < 16	389	15	0.039
16 >= X	1266	57	0.045
Subtotals	2532	179	

Table 3: RR ZDC Current Plan Runs Aircraft to Airspace Conflict Prediction Accuracy Counts

Code	RR ZDC 1740_2030		RR ZDC 2030_2230		Alert Type	Reason Description
STD_VA	88		49		VA	Standard valid alert
LATE_VA	27		31		VA	Late valid alert, valid since conflict was a popup
NO_CALL_MA	42		31		MA	No call missed alert
LATE_MA	6		6		MA	Late missed alert
NO_CALL_DISCARD	0		0		DISCARD	No call discarded since out of adherence
LATE_DISCARD	0		0		DISCARD	Late discard since out of adherence
NO_TRK_FA_DISCARD	712		368		DISCARD	No post processed track a predicted conflict start time so discard
NO_ADHER_FA_DISCARD	167		103		DISCARD	Out of adherence at predicted conflict start time so discard
CLR_FA_DISCARD	17		6		DISCARD	Retracted FA assigned by an ATC clearance so discard
CFL_FA_DISCARD	21		21		DISCARD	FA notified beyond last conflict actual start time so discard
STD_FA	112		79		FA	Standard false alert
RETRACT_FA	129		100		FA	Retracted false alert, notification end time < predicted conflict start time

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[1] Accuracy working group list includes all participants involved on URET CCLD accuracy measurement. Email sent to the ACT-250 email account, accuracy@tatca.tc.faa.gov, will be forwarded to everyone in the list.